

Sustainable urban and/or rural planning and management- **Brownfield Redevelopment**

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Abstract

Modern land development has been more associated with sprawl than sustainability. The continuous expansion of cities into the rural area seems to address the problem with the growing population as well as the desire for better living, yet, this is far from being sustainable. Land supply will one day exhaust, and the continuous encroachment and destruction of natural habitats for human settlement also tilt the balance of the natural environment, partly contributing to the climatic changes that we face today.

In the field of the contemporary landscape architecture practice, many advocate a sustainable urban development and sustainable rural expansion by re-looking into the “brownfield” sites in the heart of the cities for redevelopment. Those derelict and contaminated post-industrial sites have become the target redevelopment areas in major developed cities.

However, “brownfield” is not only the issue for the developed world. With the rapid economic developments and urban city growths in various developing countries, the *abandoned* and *undeveloped* brownfield sites and urban sprawl issues in the developing world also need immediate attention.

This paper is trying to take the brownfield redevelopment strategies in the developed world as inspirations, and to examine why brownfield redevelopment is a sustainable land planning strategy for the developing world to take on, and how the developing world can adopt the methodology of brownfield redevelopment in dealing with its urban sprawl and other land development issues, so that they can plan ahead and avoid the land planning problem that the developed world is facing now.

The redevelopment of urban brownfields not only can solve the problem of land shortages, it can also provide temporal open areas for recreation (while the land is going through phytoremediation) as well as curbing the rapid expansion of settlements into the rural landscape. It is a topic worth investigating.

Introduction

Land, through history, has been a commodity that humankind relies on. It satisfies different needs for human's survival, and its allocation and development has been, and still is, directly related to the success and downfall of human civilization. A comprehensive land development strategy is key to any sustainable society.

Since modernization, the development for both rural land and urban land has been in a debate. Many has been advocating a “balance” between the two, yet urban sprawl and industrial encroachment are still haunting the rural land, leaving the sustainable land development more or less as an *aspiration* rather than a well executed strategy.

With the slowing down of the industrial development in the Western World in recent decades, some started to look into redeveloping the brownfield sites in the urban areas, so as to ease the burden on developing the rural greenfields, and hopefully to achieve a better balance between rural and urban.

According to the US Environmental Protection Agency, the definition of brownfield is, “[a] real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.”¹ Whereas “greenfield” site usually refers to “land that has not been previously developed.”²

Most brownfield redevelopment projects in the developed world are fairly successful. Not only these brownfield sites often have strategic advantage of being situated in the heart of the current city centers and proved to have high real estate values to be redeveloped, they also help to revitalize the once rundown neighbourhoods and ease on the social development of cities.

If brownfield redevelopment in the urban areas proves to be successful in curbing the greenfield development in the rural areas in the Western World, this paper is set to examine why (or in what ways) brownfield redevelopment is also suitable for developing countries, and how developing countries can also integrate the “brownfield redevelopment” element into their “yet-to-be fully developed” land development strategy, so that they can generate a more sustainable land development in the long run, but not to repeat the imbalanced land development that the developed world has experienced before.

For the purpose of this paper, China will be taken as an example of a developing country to examine about the above issue.

China Today

The contemporary Chinese development can be characterized by two visual images – developments/expansions of cities, and huge factories/industrial parks.

Visualizing these images, one maybe in awe of the fast growing speed of these Chinese cities, and the rapid development that shows China’s determination to become the World’s biggest industrial power. Yet, these images also pose the question of – What happens to China’s countryside?

We may still recall the Chinese countryside as tranquil farmlands. But the truth is, these natural sceneries are slowly turning into man-made structures with chimneys and reactors.

With a fast growing economy, there is a desperate need more land for industrial and urban developments in China. Not only every Chinese city wants to grow bigger and to become the commercial and business hub of its own region, it also wants to expand its real estate property market and to offer more opportunities for investments, turning the immediate periphery of these recently-developed Chinese cities into a densified American suburb. At the same time, the contemporary Chinese industry development has turned the once-peaceful countryside into these massive factories/industrial parks, claiming vast pieces of land for the factories themselves, and drawing millions of workers to live in the city precinct, adding the burden to the already-stretched urban land. These industrial parks are usually tapping into the adjacent natural resources system as their source of raw materials as well, draining and exploiting the rural asset as if it is limitless.

The Chinese rural landscape is disappearing in an alarming rate. And such an imbalanced land development also reflects on an unhealthy socio-economic development.

As much as China wants to be the World’s biggest manufacturing provider and the World’s biggest economic power in the near future, it also has to feed its 1.3 billion population. Recent coverage in the Economist points out “[...] that domestically produced grain may be insufficient to feed the country. It is

decreed that a minimum of 120m[illion] hectares of arable land be preserved for this, a 'red line' that officials say is already close to being crossed."³ With this report, it clearly shows that China's rural land development is as important as its urban land development. With such a big population to feed, it is very important that China develops a sustainable rural and agricultural strategy, so that it does not have to rely on other countries as its food source, and can have a self-sustaining food supply development.

In short, a sustainable socio-economic development depends on a sustainable land use development. As each category of economic development, namely agricultural, industrial, and financial, needs a fair amount of land for development, it is very important to achieve a balance between rural and urban. And since China is still undergoing its developing phase, there are a lot more that it can implement in this stage so that China can achieve sustainability in land development without repeating what modernization has cost the now-developed world. And one of the key methods is through introducing a comprehensive "brownfield redevelopment" to China now.

Applying the Western Experience in the East - Brownfield Redevelopment in China

While the developed world has already gone through its research process and has successfully applied the redevelopment of brownfields in relation to achieve a balance between rural and urban developments, it is very important for the developing countries, in the case of this paper, China, to gain knowledge from the foreign experiences, and to derive its own methods that can tackle the brownfield situations unique to its still-*developing* landuse strategy. In the following sections, explanations of *why* and *how* redevelopment of brownfields can better equip China's sustainable land development will be covered.

Brownfield Redevelopment and Urban Sprawl

With the rapid growing Chinese economy, there is a high pressure for more land to be allocated for urban and industrial expansions. Growing into the periphery of the existing cities is an easy option, but that could quickly result in the urban sprawl – a situation that the developed world has been suffering from their rapid expansion in recent decades.

Urban sprawl broadly refers to the massive expansion of the built areas of cities through a "horizontal urbanization"⁴ – it spreads further and further in terms of land area coverage, but not growing in terms of density.

The Western World's urban sprawl was also made worse with the then-growing popularity of automobiles as a means of transportation since the post-war period. Everyone has a car, and commuting in and out of the city and the suburb on a daily basis was considered convenient with your own vehicle, attracting massive population to move to the suburb.

However, this slowly proves to be not a win-win living pattern. On one hand, the sprawling style of human development triggers massive destruction to the environment as our settlements are expanding and encroaching the natural landscape, tilting the ecological balance and indirectly leading to the extinction of thousands of species by taking away their natural habitats. On the other hand, traffic jams and air pollution become some of the biggest issues that come with urban sprawl, as thousands of vehicles are traveling unnecessarily long miles between the suburb to city centers, wasting time and energy (i.e. fuels) while polluting the environment. As Anthony Flint writes, "Americans over the decades have felt pushed and pulled between town and country. Urban settlement at first seems fashionable and full of hope and the ultimate expression of civilization. Then it becomes viewed as unhealthy and constraining and unsatisfying."⁵

With Chinese citizens' growing purchasing powers, more and more people fancy the ideas of having his/her own automobile and living in the newly-built suburb on the periphery of the Chinese cities, just like the people in the Western World. Referring to Flint's words, "[i]f the [Chinese] economy charges ahead and even a fraction of those people can move up the socioeconomic ladder, it's stupefying to think what will happen if they follow America's lead in the embrace of all things suburban."⁶ The suburban living style may symbolize prosperity and the fact that China finally catches up with the Western World's living standards, but what the Chinese citizens have to see through is the implications and consequences when adopting such living style.

If urban sprawl is a phenomenon known to have negative impacts on the overall societal development in the Western World, wouldn't China be in a much better position if it can forget about fancying the adoption of other's living style, but to get to the core of the issue by re-considering its mode of urban development, and to stop the spread of its own version of urban sprawl while they still can? Instead of learning how to take on the Western suburb living style, maybe learning about the Western World's examples of brownfield redevelopment can provide more insights on its overall sustainable land development strategy.

Brownfield redevelopment - one of the methods to counter-balance the phenomenon of urban sprawl while still manage to supply for necessary urban development - has been successfully implemented in the developed countries. As the US Environmental Protection Agency states, "[c]leaning up and reinvesting in these [brownfield] properties protects the environment, reduces blight, and takes development pressures off greenspaces and working lands."⁷ By gaining experiences from the foreign precedents, developing countries like China can take brownfield redevelopment as opportunities to avoid getting into the same urban sprawl issue that the developed world has to tackle now, or at least to slow down the sprawling process.

Therefore, if a stronger advocacy can be implemented to promote the reuse of the urban brownfield sites in China when it comes to the search for land for new development, more greenfield sites in the rural could also be saved as the rate of urban encroachment slows down. In the long run, this will then lead to a healthier land development balance, concentrating development within the city area, *densifying* the urban area while "protecting" the rural landscape.

Government's Initiative to Promote Brownfield Redevelopment

Tackling urban sprawl, encroachment to natural environment, and brownfield redevelopment are big tasks, and government's support in fact plays a vital role in making such things happen.

First, the government's incentive to initiate a clear brownfield redevelopment policy within its land development plans is important. With the current booming industrial developments in China, more and more potential brownfields are yet to be generated in the future, so incorporating the *anticipated* brownfield issues into the *current* land planning policy would avoid tackling the issue when it becomes too late.

Therefore, a clearer and more well-defined meaning of what brownfield is in China should be soon incorporated into the Chinese land use classification. By doing so, developers interested in brownfields can easily identify the potential sites and all the pros and cons that come with its brownfield land use zoning, streamlining their decision-making process of whether to take on a brownfield site for redevelopment.

On another level of land development policy, the Chinese government can consider applying some rules and/or regulations to *promote* and *attract interests* from the developers to consider urban brownfield site. For example, if developers are to take on an urban brownfield site for redevelopment, they can pay a discounted land/property tax rate than if they were to develop a greenfield site outside of the city, or some similar taxing schemes like the "Brownfield Tax Incentive"⁸ offered by the US

Environmental Protection Agency. Alternatively, government subsidy can also be granted to brownfield redevelopment projects, partly helping those who are interested in cleaning up the urban derelict sites for future use but do not have sufficient funding to maneuver a complicated site. While it is true that redeveloping a brownfield site could be expensive for individual developers to take care of, these proposed government subsidy are more or less offering some incentives to spark the developers' decisions to consider a brownfield site. Again, the US example of the "Cleanup Grants"⁹ by their Environmental Protection Agency could be a role model to reference to.

In fact, examples from the Western World have shown that developers end up making more profit by redeveloping urban brownfields than other greenfield sites. As Leon Hortense writes, "many [...] former industrial sites are in highly desirable urban infill areas and are far cheaper than comparable non-polluted properties. [...] Plus, the cost of remediation has declined in the last 10 years as the technology has improved."¹⁰ With the cleaning-up fee for brownfields continues to go down, and their prime urban locations squeeze up their rent rate, brownfield redevelopment so far proves to be commercially viable. And since urban sites usually allow a higher density than in the periphery of cities, this factor contributes partly to overall higher profit-making rate of urban brownfield redevelopment.

So, if the assumption that brownfield redevelopment makes more money than greenfield new development, the Chinese government can also consider offering loans instead of grants. For example, the US Environmental Protection Agency has established the "Revolving Loan Fund Pilot/Grants"¹¹, catering for private sectors who are interested and in need of financial support to do any brownfield cleanups. In this way, the government can also have more incentives to promote brownfield redevelopment to developers as these projects can also be income-generating when the loan is being paid back. As the developers earn more by redeveloping urban brownfield sites, the government also generates more revenue by receiving loan repayments from the profit-generating developers.

In fact, while China is still developing its system to tackle this brownfield phenomenon, a lot can be learnt from another US government's initiative called the "Comprehensive Environmental Response, Compensation, and Liability Act of 1980"¹² (also commonly known as "Superfund"¹³.) It is an "environmental program established to address abandoned hazardous waste sites"¹⁴ through the Environmental Protection Agency in the US.

What Superfund does is to provide a channel for both the government and the public to, first, identify the brownfield site, and second, to address and resolve the site contamination issues with a collective effort. It also provides a comprehensive management system to make sure that all brownfield sites identified are going to get proper remediation treatment.

If a similar system can be established in China, not only it can address the brownfield issue at a governmental level, it can also, to a certain extent, set up a benchmark of how to best take care of a post-industrial site for the private sector to follow, if they are interested in redeveloping any of these contaminated sites. With a clearer approach to brownfield remediation procedures, similar to the procedural framework set out in Superfund, it will certainly make the whole idea of brownfield redevelopment more approachable for land developers, and make brownfield sites more competitive to rural greenfield sites when it comes down to a site selection process for new development.

In Preparation for the Future – A Cleaner Industrial Development in China

Another initiative that the government can lead on in order to pave an easier way for brownfield redevelopment is to address the source – the industrial development – by establishing a high quality control standard for all existing and new factories/industrial parks in China.

While the core reason for the emergence of brownfield sites is due to the industrial processes that have impacted on the natural systems of the site (i.e. ground, soil, and the water system), it is important to safeguard a higher quality control of any industrial operation now, in order to reduce its impact for the future.

With the Chinese economy's current growing rate, industrialization will continue, and more and more factories/industrial parks will be built and in operation. Brownfield is a phenomenon that we have to deal with in our years to come, inevitably.

Rather than radically go against the industrial development and curbing any economic growth, it is wiser to think if there is anything that China can do now in order to reduce the impact in the future, for example, making sure the current operation of any factory/industrial park in China would be at a minimum cost to the environment. For instance, if Chinese legislations can implement methods to have a higher standard of how toxic wastes are treated, it could avoid massive soil/water contamination by centralizing the toxic waste dumping area to a completely sealed and enclosed area, separated from any other natural systems. These legislative controls not only can help plan ahead for China's future brownfield redevelopment, it can also help upgrade its industrialization processes to meet the environmental protection standards.

This is the time that China can hold on to itself for its own future. Back then the Western World was unable to see through the consequences of how their industries could bring negative impacts to the environment. But China's situation now is different. Its industries are still *developing*, there are still things that the Chinese citizens can *change* now, so that they do not have to repeat what has happened to the developed world.

Therefore, a comprehensive system should be established to control and monitor the quality of any industrial development facility that are setting up in China now, so as to control the amount and extent of the industrial pollution and contamination to the land and its adjacent environment. This will pave the way for a smoother and better remediation process in the future, and make brownfield redevelopment more approachable and acceptable to land developers.

Social Benefits of Brownfield Redevelopments

Social Responsibility to the Environment:

All these precautions for the future brownfield remediation may sound detached from China's current situation, but in fact if its citizens can start early it does cast a positive on-going effect to its society, especially to the sense of social responsibility to the environment.

By implementing brownfield redevelopment as part of the key land development policies as well as requesting industries to meet a higher quality control standard to monitor their pollution to the site and the immediate environment, it is then in a way promoting a sense of social responsibility among the private industrial and land development sectors towards environmental protection.

The process of implementing these higher industrial standards of control and brownfield redevelopment can be seen as educational channels that the citizens can get first-hand information of how bad we have disturbed our natural environment so far, and what we can do to re-establish a sustainable way of living again. It is through these various experiences that hopefully can induce a higher sense of social responsibility among the public.

Improvement of General Public Health, Quality of City life, and the Educational Purpose of the Temporal Open Spaces:

Looking at other social spectrums, regenerating these post-industrial and abandoned plots of land in the urban areas can also improve the general public health. As the US Environmental Protection Agency defines, the potential risks of the existence of brownfield sites to the well-beings of the general public “can be biological, physical, or chemical, and can be the result of site contamination, groundwater impacts, surface runoff, migration of contaminants, or wastes dumped on site.”¹⁵ As brownfield redevelopment involves the removal of the hazardous materials from the contaminated ground, it can then prevent the potential leakage and contamination of the toxic substances to the ground and/or water system if the brownfields were to remain, thus contributing to the social benefit of bringing a cleaner and safer environment to live in for city dwellers, and improving general public health.

Also, these brownfield redevelopments not only take away the potential hazards in the cities, they also provide the potential open space for the ever-expanding Chinese cities, contributing to the enhancement of quality of city life for its growing urban population. As mentioned in the U.K. Environment Agency’s Brownfield Land Redevelopment Position Statement, “Some brownfield and derelict land can represent important wildlife habitat, public green space or a core part of urban green networks. These are important in providing good quality of life, and brownfield reuse must strike an appropriate balance in the interests of sustainable development.”¹⁶

“Brownfield” implies that there are contaminants in the ground/soil, and certain planting/vegetation strategy can help remediate the contamination in the soil, “healing” the site and *preparing* it for another future use. It is during this “phytoremediation” period that the site can be best used for recreational purposes for the city dwellers. While the vegetation is healing the site, the city dwellers are also offered some green open spaces in the heart of the cities. Even though this phytoremediation process is only temporal, but in the contemporary city living where land is a hot commodity yet there is a constant debate about shortage of public open space in the urban areas, the temporal function of these remediating-brownfields as public open spaces offers perfect solutions for both ends.

Moreover, this “brownfield phytoremediation” type of open space carries an important educational purpose – while the mass of Chinese citizens are now still learning the balance between industrial development and its potential environmental hazards, i.e. pollutions and contaminations that industrialization leaves to the environment and their impacts on human’s health, these remediating-brownfield open spaces offer a chance for the contaminated lands to speak for themselves and offer the citizens a direct interaction with the other expression of industrialization that they may not have realized. Foreign examples of the brownfield-turned open space usually leave the remnants of the factory structures and/or machines intact, partly because they are too toxic to remove, and partly because they can be displayed as artifacts to remind people about the true facts of what other aspects that industrialization has brought to the land and the citizens that live around there. These pieces often show the history and explain the mechanisms of the then-factory, helping the visitors to understand a complete picture of industrialization, and making them aware of the need to seek a balance between nature and industrialization before they “sacrifice” all their precious greenfields in the rural landscape for industrial progress without thorough consideration.

Saving Public Expenses:

While typical urban brownfields are usually the remnants of old factories/industrial complexes, they often come with existing built structure/infrastructure or at least have connections to the existing infrastructural network that can be potentially re-used by the future users.

With China’s rapid urban growth, thousands of millions of the Chinese Yuan dollars are designated for new infrastructure every year, making ways for new cities. If more considerations could be put towards brownfield redevelopments, more existing built structure/infrastructure can then be re-used, saving

government expenditures that are supposedly spent on new infrastructure for other types of expenses. On a macro-scale of city planning's perspective, lesser cost is incurred, and the overall governmental budget is saved, indirectly benefiting other social welfare spectrums that are more in need.

Reconstructing the Community:

On the other hand, brownfield regeneration can also help to build a stronger sense of community where the industrial precinct used to be and enhance social-connectedness. Often times, when a factory moves out, the workers also scatter, and what remain are the empty shell of the factory building and a closed-off periphery of the site. It loses its sense of being a neighbourhood, vibrant with workers' activities and the intricate living pattern of a community. This derelict scene is described by Lars Lerup as a "holey plane"¹⁷, with these voids waiting to be re-connected. Regenerating a brownfield site is then like bridging a gap, with the redevelopment itself being the "bridge". By implementing redevelopment to such brownfield sites in China, not only can it revitalize the neighbourhood by injecting a new function to the derelict site, but also to rebuild the community by re-connecting it to the current adjacent neighbourhoods, strengthening its tie to the existing urban fabric.

Conclusion

China has a very bright prospect in doing a much better job in handling brownfield redevelopment than what the current Western World is able to achieve. Partly because the developed world's brownfield redevelopment examples provide a lot of inspirations for China to reference to, and partly because China is at a stage that it can still *modify* and *change* its land development policy and industrial policy before it's too late.

Brownfield sites may not be something that China can totally avoid, but at least it can be something that it leverages on to, so that it can achieve a more sustainable rural and urban land development for the future China, and to provide a World-class living environment for its 21st Century citizens.

Notes

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